American Journal Of Social Sciences And Humanity Research
(ISSN – 2771-2141)
VOLUME 03 ISSUE 12 PAGES: 135-147
SJIF IMPACT FACTOR (2021: 5. 993) (2022: 6. 015) (2023: 7. 164)
OCLC – 1121105677
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: Oscar Publishing Services

OSCAR PUBLISHING SERVICES

Journal Website: https://theusajournals.com/index.php/ajsshr

Research Article

RECOVERY STRATEGY IN SPORTS

Submission Date: December 06, 2023, **Accepted Date:** December 11, 2023,
Published Date: December 16, 2023
Crossref doi: https://doi.org/10.37547/ajsshr/Volume03Issue12-18

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ABSTRACT

The process of returning the body to normal after any workout is called recovery. Good recovery is the process that allows an athlete to recover from fatigue caused by training or competition and replenish their energy reserves. These days, athletes in most sports train very hard 2-3 times a day. In fact, players working for top clubs may have to play in an international cup match, a league match, a domestic cup match or their country's domestic match in the same week. This condition exposes athletes to the stress of travel as well as the physiological stress they experience during competition and training. Such strenuous training, competition and travel can cause a temporary decrease in the performance of athletes. Exerting before full recovery can lead to chronic fatigue in the athlete, and chronic fatigue can lead to injury. Physiological and psychological recovery of athletes must be programmed within training to avoid overtraining syndrome and achieve optimal results. For a long time, sports scientists and coaches have been trying to find the most suitable recovery method for athletes to achieve full recovery. Optimal performance is possible by maintaining a balance between load and recovery, so stretching, massage, immersion therapy at different temperatures, contrast baths or showers, aerobics. It should be used to speed up recovery after low-intensity activities such as running, swimming, pool walking, strenuous workouts or competitions. The creation and implementation of promising recovery programs will allow athletes to rest before subsequent training and competitions, and therefore will increase their competitive and training results. The purpose of this study is to examine the impact of recovery on performance by examining recovery research in the literature and to serve as a reference for future research on this topic.

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KEYWORDS

Recovery, athlete, training, sport, exercise, physiological, psychological, stress.

INTRODUCTION

Recovery is the process by which the body returns to its normal state after any exercise. Recovery is defined as the physical and mental renewal of an athlete to best eliminate the fatigue that occurs after intense exertion during training or competition and return the athlete to the physical and psychological state before training or play . Good recovery is the process that allows an athlete to recover from fatigue caused by training or competition and replenish their energy reserves. If complete recovery has not occurred, the athlete; Chronic fatigue and muscle weakness may occur. This can lead to the athlete abstaining from sports for some time or even leaving the sport.

These days, athletes in most sports train very hard 2-3 times a day. If these workouts cause physiological and psychological stress to the athlete, the same training loads, more than three hours of training per day, increasing the training load by more than 30% per week, consecutive overloads, errors in training intervals and no rest. On this day, the stress of athletes increases. For example, players working for top clubs may have to play in a week's time in an international cup match, a league match, a domestic cup match or a domestic match for their country. This condition exposes athletes to the stress of travel as well as the physiological stress they experience during competition and training. Such strenuous training, competition and travel can cause a temporary decrease in the performance of athletes. Exerting before full recovery can lead to chronic fatigue in the athlete, and chronic fatigue can lead to injury. With this in mind, athletes' physiological and psychological recovery must be programmed within training to avoid overtraining syndrome and achieve optimal performance. For a long time, sports scientists and coaches have been trying to find the most suitable recovery method for athletes to achieve full recovery. Establishing and implementing promising recovery programs will ensure that athletes are well rested for subsequent training and competition, thereby enhancing their competitive and training performance. Optimal performance is achieved by maintaining a balance between load and recovery. Therefore, low-intensity activities such as stretching, massage, immersion therapy at different temperatures, contrast baths or showers, aerobic running, swimming and swimming should be used to speed up recovery after heavy training or competition. The purpose of this study is to examine the impact of recovery on performance by examining recovery research in the

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literature and to serve as a guide for future research on this topic.

RESTORATION GOALS

This is necessary to treat damage caused by competition and reduce or eliminate fatigue. Other goals to reduce fatigue; This is explained by the normalization of body functions, normalization of homeostatic balance, renewal of energy resources and normalization of enzymatic functions.

TYPES OF RESTORATION

Athletes spend most of their time recovering from training/competition. These applications are required for optimal performance. However, there are not many studies on restoration in the literature.

According to studies in the literature, recovery is divided into 3 parts.

A. Fast recovery

This refers to the process of recovery between repeated movements within a very short period of time. An example of this is the recovery of one leg between every two steps in race walking. During this recovery, ATP in the leg muscles needs to be renewed and byproducts removed. Faster recovery of each leg allows the athlete to cover the specified distance faster. Researchers have found that if an athlete's stride is quickened and the athlete's recovery time is shortened, training time and training distance are reduced. This suggests that high intensity exercise leads to fatigue in a short period of time.

B. Short-term recovery

Short-term recovery is rest between repeated sprints or sets during strength training. In short-term recovery, the rest period is very important for the athlete to perform the next performance. To determine this period, after the same type of exercise, rest breaks of different lengths were given and the results were compared with each other. These studies found that 15 and 30 seconds of rest between bouts of intense exercise resulted in significantly lower performance compared to 60 and 120 seconds of rest.

Although short rest was found to have a significant negative effect on perceived difficulty level, lactic acid levels, and power output, the time to peak power was not affected by the rest period. It is noted that a minute of rest after intense training allows you to replenish a very small part of creatine phosphate (CPP) reserves. A 4-minute rest was found to have a significant effect on PCr, but did not guarantee full replenishment of the reservoirs. They found that PCR resynthesis reached 64% after 1.5 minutes and 85% after 5 minutes.

C. Long-term recovery

This type of recovery involves the recovery process that occurs between two consecutive practices or

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games. In some sports, athletes must train twice a day, and in some sports, they may have two competitions or meets in the same day. This situation clearly shows the importance of the recovery process. Researchers say that 4 and 8 hours of rest after aerobic exercise negatively affects performance, so the rest period after aerobic exercise should be at least 8 hours, and 24 hours of rest is necessary for full recovery. Replenishing energy resources is one of the factors that directly affects the recovery process, so the amount of carbohydrates taken in the first hour after a competition or training is very important. It should be remembered that when muscle glycogen is replenished at 5% per hour, it takes 20 hours for full recovery.

FACTORS AFFECTING THE PROCESSING PROCESS

Factors affecting the recovery process are listed below.

- Age, gender, experience of the athlete
- Health condition, whether disability or injury
- Regenerative capacity, aerobic strength
- Genetic factors (muscle fiber distribution)
- Energy requirements for training
- Characteristics and needs of an athlete sports network
- Similar loads and overtraining (cortisol-ammonia)
- nutritional status
- Climatic differences, altitude (environmental factors)
- Psychological factors
- Personal life (sleep, lifestyle, bad habits), calming, calm, positive, reliable social environment.
- Jet varnish effect
- The use of special recovery methods (massage, ultrasound, hydrotherapy, thermotherapy, chemotherapy (vitamins), acupuncture, yoga, psychological treatment (suggestion and motivation, entertainment)
- Time.
- RESTORATION METHODS
- Below are methods that have proven effective in recovery.
- Use of nutrition, hydration and ergogenic aids.
- Aquatic therapy or immersion therapy (use of cold, heat or contrast)
- Low intensity aerobic running
- stretching
- Massage
- Anti-inflammatory and analgesic use.
- Electromyostimulation
- Ultrasound
- Hyperbaric oxygen therapy
- Psychological relaxation therapy
- Improve lifestyle

RESTORATION RESEARCH

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Bosak's study compared active and passive rest methods. 12 trained runners of the first group were given active rest after running 5 km, and 12 athletes of the second group were given passive rest after running the same distance. They found no statistically significant difference when comparing the two relaxation methods. On the other hand, they reported that there are some differences in recovery time among some athletes, so recovery exercises should be performed individually.

There are studies using Doppler ultrasound and xenon flushing techniques, and massage before and after exercise does not have a significant effect on increasing blood flow.

One of the reasons why massage is used for recovery purposes is that it speeds up the elimination of lactate. When lactate is formed, the pH decreases. A decrease in pH leads to inhibition of the enzyme phosphofructokinase, glycolysis slows down, energy sources are reduced and muscle contraction is limited. Accumulated lactate in the muscles and blood causes fatigue. Many studies have been conducted to determine the effects of massage on this fatigue byproduct. As a result of these studies, it was found that massage does not have a significant effect on the elimination of lactic acid.

In a study conducted by Robertson, they examined 30 athletes after a 30-second wing test, a 30-second rest period, and a 20-minute massage. They reported that the results showed no change in blood lactate levels, but improved the fatigue index by 34–30%.

However, there are studies in the literature showing a significant effect of massage on performance indicators such as the fatigue index and the total amount of work performed. GCA, which typically occurs 24 to 72 hours after exercise involving eccentric contractions, is one of the most important issues for athletes and coaches in the recovery process. HGG causes chronic pain, muscle dysfunction and decreased athletic performance in athletes. Research shows that massage significantly reduces HGG levels.

There are not many studies that find positive results regarding the effects of massage on physiological phenomena such as lactic acid elimination during post-workout recovery. Although some studies show that massage has a positive effect on VVA, there is conflicting literature. Considering all these results, we can conclude that the most important effect of massage on the healing process is psychological.

A study conducted by Malm reported that after a soccer match, the effects of fatigue and strenuous soccer training on the immune system lasted for 24 to 48 hours.

Studies examining the effects of active recovery have typically used active recovery exercises at 30–60% of maximal oxygen uptake. There are also studies in the

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literature that explore what this violence should be like. In a study by Belcastro and Bonen, they used different recovery intensities ranging from 30% to 80% of VO2max and found that the amount of lactic acid eliminated decreased with increasing intensity. However, Arslan found no statistically significant difference between lactic acid half-life during active periods performed at 40% and 60% VO2max.

Baldari, on the other hand, suggested that the intensity of recovery should be based on the rate of anaerobic threshold, and in their studies they found that recovery at and below the threshold was more effective in losing lactic acid. Another factor discussed in active recovery research is active recovery time; In these studies, there was a positive effect of active recovery for 3 and 5 minutes on performance, but this was independent of lactic acid.

Although the effect of active recovery on reducing lactic acid levels has been shown in all studies, there is controversy regarding the results of training. The most important thing to do to get the most out of active recovery is to fine-tune the duration and intensity of active recovery. Although active recovery that takes longer than necessary will tire the athlete, performing it at high intensity will continue to build up lactic acid. Therefore, active recovery for 10–30 minutes above the anaerobic threshold may be preferable.

Carbohydrates after long workouts are effective in restoring muscle glycogen. Miles found that carbohydrate loading after high-intensity exercise had no effect on C-reactive protein, cortisol and creatine kinase, which are associated with muscle pain.

The key to recovery after competition is replacing expended energy and lost fluids. The first two hours after finishing a competition or training are very important and this period is called the "golden hours". During this period, the activity of the enzyme that ensures glycogen synthesis increases. Carbohydrates consumed two hours after a competition or workout have been shown to increase glycogen levels more effectively and faster than those consumed six hours later. In the first 30 minutes after competition, the athlete is recommended to consume 1.5 g of carbohydrates per kilogram. During these golden hours after the competition (the first two hours), it is advisable to eat carbohydrate foods that are easily digested, have a high glycemic index and enter the bloodstream (sweet flour products, rice, pasta, etc.). shortly after acceptance.

The abundance of research on carbohydrate loading has led to the idea that protein loading may also be effective for recovery. In Rowlands' study , they found that a high protein diet had no effect on plasma insulin, cortisol and growth hormone, but resulted in a 25% increase in testosterone levels. Additionally, the same

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study found that a high protein diet had no effect on performance.

There is a wealth of research in the literature on the effects of fluids used during recovery on recovery. Carbohydrate-containing beverages were found to have no effect on plasma glutamine and other amino acids during exercise or at rest, and exercise did not significantly reduce plasma amino acid concentrations. In a study that examined the effects of carbohydrate-electrolyte liquids after a 90-minute game, blood glucose concentrations and dribble test scores at the end of the game were better in the group that consumed these drinks. does not have a significant effect on the results of tests for coordination and strength.

As a result, carbohydrates consumed immediately after training or competition are very effective for long-term recovery. Fluid intake is also important for maintaining performance, but there is no evidence that consuming protein and fat or adding them to drinks makes any difference.

For recovery strategies through nutrition and hydration to be fully successful, they must be applied not only after competition and training, but also before and during competition/training. Before competition/training, preference should be given to foods that are low in fat and fiber and moderately high in protein and carbohydrates. Carbohydrates should have a low glycemic index. In addition, you should not neglect fluid intake before competitions and training. During competition and training, it is important to drink 4-8% carbohydrate fluid to meet fluid and energy needs.

Various water applications (cold water, hot water and mixed systems) are gradually gaining popularity for restoration. Water consumption reduces heart rate and cardiac output while increasing blood pressure and peripheral resistance. In addition, there are publications that reduce acute inflammation and pain. A significant effect of cold water application on performance was also found. The application of cold is thought to reduce tissue inflammation and swelling by slowing metabolism and waste production by reducing tissue heat. Nervous activity is also affected by cold. Cold application reduces the production of the tissue neurotransmitter acetylcholine and increases muscle spindle activity. This slows down afferent impulses and reflex responses, so nerve conduction slows down. In this case, it reduces muscle spasm and pain.

In his study, Viitasalo found that hydrojet massage applied over three consecutive days of strength training reduced multi-jump force and slowed contact time, and increased serum myoglobin levels. This study also found that aquatic massage increased the release of proteins released from muscle tissue into the blood during strength training and maintained the continuity of neuromuscular interactions. Another study found

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that using a hot bath had no significant effect on blood pressure and heart rate, and reported that using hot water was more effective at removing lactate than passive relaxation.

Although blood flow in and under the skin increases with hot water therapy, blood flow in the muscles decreases at lower water temperatures. Therefore, it is argued that hot water therapy has less effect on the transport of nutrients and waste products in the muscles than cold water. As you know, recovery methods that combine the use of hot and cold water are a common method used in the recovery of athletes. In his study, Coffey compared the effects of active, passive and contrast aquatic techniques on recovery. At the end of the study, it was found that lactic acid concentrations were significantly lower during active rest and when using a contrast bath. It was noted that the most effective method in terms of perceived fatigue is the contrast bath method.

Vasoconstriction changes when cooled, and vasodilation changes when warmed, creating a pumping effect on the muscles, increasing blood flow, removing metabolic waste, and speeding recovery. Cold and hot water therapy reduces swelling, redirects blood flow and reduces muscle spasms by constricting and dilating blood vessels in response to temperature changes in the blood vessels.

As a result of these studies, it was possible to combine many restoration methods and create new combined methods . Research shows that when massage is combined with active recovery, the recovery process is accelerated psychologically and physiologically. The combination of active recovery with the use of cold water is believed to speed up recovery, despite disadvantages such as psychological discomfort and material demands.

DISCUSSION AND CONCLUSION

Many studies have questioned which recovery models are more effective in addressing performance-impairing factors such as lactic acid clearance, muscle damage, and ROM. Although studies have come to different conclusions, there are studies that provide similar results. It is hypothesized that these differences may be due to the diversity of the subjects used in the studies, the timing of the chosen method, the intensity of application and the structure of the exercises that caused fatigue in the athlete. recovery exercises. Although all researchers agree that active reduction is more effective than passive reduction in removing lactic acid from the blood, results are inconsistent when compared to other methods.

Although research into massage therapy has established that it has positive psychological effects on athletes, research on physiological responses has been inconsistent. It is known that for effective recovery,

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the rest period between two loads is as important as the method used.

Points that sports scientists should consider when planning their future studies may include: The study selected groups of subjects from different groups, determined the optimal duration of active rest and intensity of exercise, timing and method of application, and the characteristics of the effects of massage in different environmental conditions. considering water applications and application times, such as different water temperatures, solids application times, different nutrients and application volumes, combining different restoration methods for different times and routes, and testing new methods.

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